

REMARKS

Applicants have amended the claims to more clearly identify inventive subject matter.

Applicants have amended claims 1, 6, 7, 9, 15, 26, and 27, and cancelled claim 5. The amendments introduce no new matter. Claims 6, 7, 9, 15, 26, and 27 have been amended to correct minor formalities including incorrect claim dependencies. Claims 1, 2, 6-15, 17 and 25-27 are presented for examination at this time.

Applicants' Invention

Applicants' invention is directed to a substrate processing system including first and second robotic arms for capturing and releasing a semiconductor wafer and an interleaf, respectively. The processing systems involved with semiconductor wafers are complex. Not only do the semiconductor wafers require extreme sensitivity when handling, but also the interleaf sheets are also generally extremely thin and flexible, making handling and proximity detection difficult. In order to address the difficulties in handling an interleaf, the second robotic arm of the claimed system includes an end effector which applies both positive pressure and vacuum pressure to capture and release the interleaves. A sensor is further used to detect changes in pressure and signal the end effector to reduce the positive pressure.

The Cited Prior Art

Japanese Patent No. 11163091 (Ichikawa)

Ichikawa, as can be understood from its English abstract, discloses independent robots for transferring semiconductor wafer and sheets.

U.S. Patent No. 3,993,301 (Vits)

The Vits patent is directed to an apparatus for lifting a top sheet of material from a stack of material, the apparatus including a generally flat foot member interfacing the top sheet of the stack. The flat foot member has an arcuately shaped channel cutout on its surface, the channel being in gaseous communication with an internal conduit connected to a source of gas under pressure. The arc shaped slot on the flat foot member emits air radially from the arc in order to aid the flat foot member in capturing a top sheet of material in a stack of material. It is unclear with what type of sheets with Vits is designed to be used.

U.S. Patent No. 5,569,328 (Petvai)

The Petvai patent is directed to a system for manufacturing semiconductor devices from silicon wafers, including a testing arrangement for testing the silicon semiconductor wafer for contaminants using a liquid test drop. Petvai has been cited by the Examiner because it contains a counterweight 17 to an arm 18 within the system.

Rejections Under 35 U.S.C. § 103

Reconsideration is requested of the rejection of claims 1, and 12-14 as defining subject matter that would have been obvious over Ichikawa (JP 11163091) in view of U.S. Patent No. 3,993,301 to Vits.

Ichikawa discloses a wafer packing robotic device for storage and conveyance of wafers between factories. Ichikawa fails to disclose the application of positive pressure to an interleaf surface facing an end effector. Vits discloses a device for raising the top sheet of a pile by blast

air. The Examiner alleges that the combination of the two renders the presently claimed invention obvious.

Applicants have amended independent claims 1 to include a sensor for determining when to reduce said positive pressure and subsequently apply a negative pressure in the process of capturing the interleaf. Neither Ichikawa nor Vits disclose such a sensor. Claims 12 and 14 depend directly or indirectly from claim 1. Withdrawal of the rejection is respectfully requested.

Rejections Under 35 U.S.C. § 103

Reconsideration is requested of the rejection of claims 2, 5-11, and 25-26 as defining subject matter that would have been obvious over Ichikawa (JP 11163091) in view of U.S. Patent No. 3,993,301 to Vits and U.S. Patent No. 5,569,328 to Petvai.

Each of claims 2, and 5-11, and 25-26 depend directly or indirectly from independent claim 1, which recites a second robotic arm with an end effector with a sensor for determining when to reduce positive pressure to an interleaf. The Examiner alleges in response to previous claims 5-8 that Ichikawa discloses a sensor 22, 23, which uses reflectance.

As presently claimed however, a sensor on the second robotic arm is not disclosed in Ichikawa. The sensor is specifically designed to indicate when positive pressure should be stopped in capturing an interleaf. See specification, pages 9, line 30 through page 10, lines 4. The claimed sensor determines a reduction in pressure to transfer arm 40 and the system next applies a vacuum to the interleaf sheet 30 to secure the interleaf sheet to the end effector for transport. The use of this interleaf end effector results in a highly reliable interleaf transfer mechanism independent of the porosity and geometry of the interleaf sheet.

The presently claimed system is a complete substrate processing system capable of handling the intricacies of processing and transporting semiconductor wafers and interleaves. The Examiner has cited numerous references, each disclosing different facets of the present invention. There can be found no teaching, suggestion, or motivation however to combine the cited references to give the present combination. Furthermore, because Ichikawa does not possess an end effector utilizing both negative and positive pressure for capturing an interleaf, it cannot have the presently claimed sensor. The rejection is respectfully traversed.

Rejections Under 35 U.S.C. § 103

Reconsideration is requested of the rejection of claims 15, 17, 27 as defining subject matter that would have been obvious over Ichikawa (JP 11163091) in view of U.S. Patent No. 3,993,301 to Vits and U.S. Patent No. 5,569,328 to Petvai.

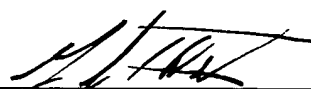
None of the cited references discloses a pneumatic separator for separation of the interleaves, wherein the pneumatic separator is actuated in sequence with the end effector to facilitate capturing of an interleaf as claimed in independent claim 15. Claims 17 and 27 depend therefrom and therefore also include this element. Withdrawal is respectfully requested.

The application is considered to be in condition for allowance, and such action is respectfully requested.

Respectfully submitted,

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